When is a wetland successfully restored?
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Re-establishing hydrology is the first, and most likely the most important step in wetland restoration (Mitsch and Gosselink 1993). It is one of the fundamental forces that maintain wetland ecosystems. However, if our project is wetland restoration and hydrology is re-established, when is that wetland restoration considered successful? A loaded question indeed, but one of the determining factors of the success of a restoration is the project goals. They should take into account site history and previous use(s), as well as site "stressors" that may remain in the surrounding landscape even after restoration efforts conclude.

Clearly defining goals, objectives and if possible performance standards (Streever 2001) for wetland restoration projects is a critical part of restoration success. For example, a project goal might be to increase quality of wildlife habitat with an associated objective to improve breeding habitat for waterfowl and other bird species. Your restoration methodology may be to take the "wet area" out of production because the hydrology is present and just plant a few herbs. Research shows that providing breeding habitat for waterfowl can be accomplished in 1-2 years (VanRees-Siewert and Dinsmore 1996) because the main determining factor for waterfowl breeding is wetland area. However providing breeding habitat for other bird species may take significantly longer and may require specialized vegetative plantings due to their breeding dependence on vegetation characteristics. Hence, one project goal is likely to be achieved in this example, while the other would not, without further efforts.

Site history and previous land uses are important in knowing what possible pathways some of the biotic components may take during restoration. If a site's previous use involved chemical application or use of heavy metals, various species of invertebrates and microbes may experience deleterious effects in their composition, survival, growth, reproduction, and development (Adamus et. al 2001). This may be observed immediately or may occur over many years. Even though wetlands serve to store contaminants and metals, changes in pH from precipitation alone can cause these elements to become soluble. This can induce complex interactions and postponed development of the remainder of the wetland's wildlife functions and community.

Restoration goals and objectives should also take into account continued stressors that will remain even after restoration efforts are complete. In essence, approach the restoration in the context of landscape management. If density of roads and the proportion of urban land-use is high and most likely will remain unchanged, expect amphibian species richness to remain low (Lehtinen et. al 1999). Hence, keep your goal low for amphibian diversity or don't include it at all. If agricultural practices will remain in the watershed of your restored wetland, expect zooplankton taxon richness to be low or comparable to that of a completely agriculturally impacted wetland (Dodson and Lillie 2001). However, if surrounding land management is possible and the entire wetland watershed were taken out of agricultural production as part of the restoration, Dodson and Lillie (2001) report an increase in zooplankton taxon richness in restored sites as compared to least-impacted reference wetlands in about 6-7 years. This wetland restoration could result in a closer approximation of "historic" conditions.

The above also points out an important factor that should be included in project goals and objectives: time. Waterfowl breeding may occur in 1-2 years while zooplankton taxon richness may take 6-7 years. Batzer and Sion (1999) found some wetlands may never completely recover their invertebrate communities when they compared formerly deforested areas, not logged since the 1800s, to old-growth areas. Each wetland restoration project is different and comes with a different set of circumstances. To improve you rate of success, create realistic goals that consider time to reach the set goals, previous disturbances and continued stressors to that system. We can't always recreate historic systems, but this should not preclude us from striving for the highest level of wetland functioning.

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